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IMPLEMENTATION PLAN REVIEW FOR MASSACHUSETTS AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

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IMPLEMENTATION PLAN REVIEW

FOR

MASSACHUSETTS

AS REQUIRED

BY

THE ENERGY SUPPLY

AND

ENVIRONMENTAL COORDINATION ACT

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16. ABSTRACT

Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interferring with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised.

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FOR

MASSACHUSETTS

AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

PREPARED BY THE FOLLOWING TASK FORCE:

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MASSACHUSETTS

ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT
(SECTION IV - STATE IMPLEMENTATION PLAN REVIEW)

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1.0 EXECUTIVE SUMMARY

The enclosed report is the U.S. Environmental Protection Agency's (EPA) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the State on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the States. The States may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however, require States to change any existing plan.

Congress has intended that this report provide the State with information on excessively restrictive control regulations. The intent of ESECA is that SIP's, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallel EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regards to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage States to either defer compliance regulations or to revise the SO_2 emission regulations. The States have also been asked to discourage large scale shifts from coal to oil where this could be done without jeopardizing the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those States with the largest clean fuels saving potential. Several of these States have or are currently in the process of revising SO_2 regulations. These States are generally in the Eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 States and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, three predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are (1) The use of the example region approach in developing State-wide air quality control strategies; (2) the existence of State Air Quality Standards which are more stringent than NAAQS; and (3) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations affect many State plans and in some instances conflict with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIP's conducted in 1972. At that time SIP's were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a State to identify the most polluted air quality control region (AQCR) and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCR's of the State if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in excessive controls, especially in the utilization of clean fuels, for areas of the State where sources would not otherwise contribute to NAAQS violations. For instance, a control strategy based on a particular region or source can result in a regulation requiring 1 percent sulfur oil to be burned state-wide where the use of 3 percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of States will use the review findings to assist them in making the decision whether or not to revise portions of their State Implementation Plans. However, it is most important for those States which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there have been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the reports' findings are based are the most currently available to the Federal Government. However, EPA believes that the States possess the best information for developing revised plans. The States have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of air quality. Therefore, those States desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that States select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increased TSP, NO_x, and HC emissions which occur in fuel switching, and other potential air pollution situations such as sulfates.

Although the enclosed analysis has attempted to address the attainment of all the NAAQS, most of the review has focused on total suspended particulate matter (TSP) and sulfur dioxide (SO_2) emissions. This is because stationary fuel combustion sources constitute the greatest source of SO_2 emission and are a major source of TSP emissions.

Part of each State's review was organized to provide an analysis of the SO_2 and TSP emission tolerances within each of the various AQCR's. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined in Section 2 and Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendix C, D, and E.

The Commonwealth of Massachusetts' State Implementation Plan has been reviewed for the most prevalent causes of over-restrictive fuel combustion, emission limiting, regulations. The major findings of the review are:

FOR SO_2, THERE ARE TWO AQCR's, BERKSHIRE AND CENTRAL MASSACHUSETTS, WHICH INDICATE SOME POTENTIAL FOR ADDITIONAL REVISION OF FUEL COMBUSTION SOURCE EMISSION LIMITING REGULATIONS. HOWEVER THESE AQCR's HAVE LIMITED POTENTIAL DUE TO RELATIVELY LOW VOLUMES OF TOTAL FUEL USED.

FOR TOTAL SUSPENDED PARTICULATES, THERE ARE NO AQCR's WHICH INDICATE ANY POTENTIAL FOR REVISING FUEL COMBUSTION SOURCE EMISSION LIMITING REGULATIONS.

The supportive findings of the SIP review are as follows:

Recent actions by the state of Massachusetts parallel the intentions of Section IV of ESECA. In an attempt to reduce the impact of fuel shortages, and to conserve clean fuels, Massachusetts has recently passed legislation mandating a relaxation of all statewide ambient air quality standards to the NAAQS levels. Furthermore, all implementation plan requirements are being modified as much as possible under this law. Recognition of possible clean fuel savings has occurred in Massachusetts even prior to this most recent legislation with a short-term change in the sulfur content requirement for distillate oil. The change increased the sulfur content of distillate oil from 0.17 pounds per million BTUs to 0.28 pounds per million BTUs. Although this distillate oil relaxation is to expire April 15, 1975, EPA has indications that this relaxation will become permanent if no adverse trends in air quality are noted. Also, other changes in sulfur content and particulate limitations are expected.

Massachusetts approved the fuel conversion from oil to coal at four power plants within the state in 1973. They were: Salem Harbor, Brayton Point (New England Power Co.), West Springfield, and Mt. Tom. The conversion of the West Springfield plant was disapproved, however, by EPA due to possible violations of the NAAQS.

In most areas within the state power plants are the largest emitter of sulfur dioxide. A case-by-case review of the existing regulations (as done by Harvard University, Appendix F) may indicate a potential to save clean fuels if modeling results for point and area sources are available.

Like many other areas of the nation, high levels of total suspended particulates are currently being found throughout the State of Massachusetts. Fuel combustion sources within the state are estimated to contribute about half of the TSP emissions, with area wide fuel combustion sources contributing about 30 percent. Although it may be possible to relax the particulate limitations regulations in select cases, indiscriminate relaxations of the regulations would aggravate the existing situation.

2.0 STATE IMPLEMENTATION PLAN REVIEW

2.1 SUMMARY

A revision of fuel combustion source emissions regulations will depend on many factors. For example:

- Does the State have air quality standards which are more stringent than NAAQS?
- Does the State have emission limitation regulations for control of (1) power plants, (2) industrial sources, (3) area sources?
- Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?
- Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?
- Are there no proposed Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment date for NAAQS?
- Based on (1973) air quality data, are there no reported violations of NAAQS?
- Based on (1973) air quality data, are there indications of a tolerance for increasing emissions?
- Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources?
- Is there a significant clean fuels savings potential in the region?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?

The following portion of this report is directed at answering these questions. An AQCR's potential for revising regulations increases when there are affirmative responses to the above.

The initial part of the SIP review report, Section 2 and Appendix A, was organized to provide the background and current situation information for the State Implementation Plan. Section 3 and the remaining Appendices

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provide an AQCR analysis which helps establish the overall potential for revising regulations. Emission tolerance estimates have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for revising emission limiting regulations. In conjunction with the regional analysis, a characterization of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendix C, D, E.

Based on an overall evaluation of EPA's current information, AQCR's have been classified as good, marginal, or poor candidates for regulation revisions. Table 2-1 summarizes the State Implementation Plan Review. The remaining portion of the report supports this summary with explanations.

2.2 AIR QUALITY SETTING

The State of Massachusetts is divided into six Air Quality Control Regions (AQCR's), three of which are interstate regions (Figure 2-1). The regions are named as follows:

- Berkshire Intrastate AQCR - 117
- Central Massachusetts Intrastate AQCR - 118
- Metropolitan Boston Intrastate AQCR - 119
- Metropolitan Providence Interstate (R.I) AQCR - 120
- Merrimack Valley - Southern New Hampshire Interstate (N.H) AQCR - 121
- Hartford - New Haven - Springfield Interstate (Conn.) AQCR - 42

Air quality monitoring in the Berkshire region consists of six stations for total suspended particulates (TSP) and seven stations for sulfur dioxide (SO_2). Monitoring results for 1973 show no violations of the federal standards. Emission summaries indicate that about half of the TSP and almost all of the SO_2 come from fuel combustion sources.

In the Central Massachusetts AQCR four of nine reporting monitors indicated violations for the TSP standards in 1973, while there were no violations for SO_2 at the ten reporting stations. The region has been designated as a proposed Air Quality Maintenance Area (AQMA) for TSP. Emission summaries

TABLE 2-1

STATE IMPLEMENTATION PLAN REVIEW
(SUMMARY)

"Indicators"	State		Berkshire AQCR 117		Central Massachusetts AQCR 118		Metropolitan Boston AQCR 119		Metropolitan Providence AQCR 120		Merrimack Valley Southern New Hampshire AQCR 121		Hartford - New Haven Springfield AQCR 42	
	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2
• Does the State have air quality standards which are more stringent than NAAQS?	No	No												
• Does the State have emission limiting regulations for control of:														
1. Power plants	Yes	Yes												
2. Industrial sources	Yes	Yes												
3. Area sources	No	No												
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?	Yes	Yes												
• Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?	No	No												
• Are there no proposed Air Quality Maintenance Areas?			Yes	Yes	No	Yes	No	No	No	Yes[5]	No	Yes[4]	No	Yes[3]
• Are there indications of a sufficient number of monitoring sites within a region?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• Is there an expected 1975 attainment data for NAAQS?			Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
• Based on (1973) Air Quality Data, are there no reported violations of NAAQS?			Yes	Yes	No	Yes	No	Yes	Yes[1]	Yes[1]	Yes[2]	Yes	No	No
• Based on (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?			No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No
• Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources?			No	No	Yes	No	No	No	No	No	No	No	No	No
• Do modeling results for fuel combustion sources show a potential for a regulation revision?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• Must emission limiting regulations be revised to accomodate significant fuel switching?			Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
• Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?			Poor	Good	Poor	Good	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
• Is there a significant Clean Fuels Saving potential in the region?			No	No	No	No	No	No	No	No	No	No	No	No

[1] There were violations in the Rhode Island Portion of the region

[2] There were violations in the New Hampshire Portion of the region

[3] There are proposed AQMA's in the Connecticut Portion of the region

[4] Carlisle and Bexford are included in the Boston AQMA.

[5] Kent and Providence Counties are designated by the State of Rhode Island. Milford, Medway, Bellingham, Franklin, Wrentham, Foxboro, and Kingston are included in the Boston AQMA.

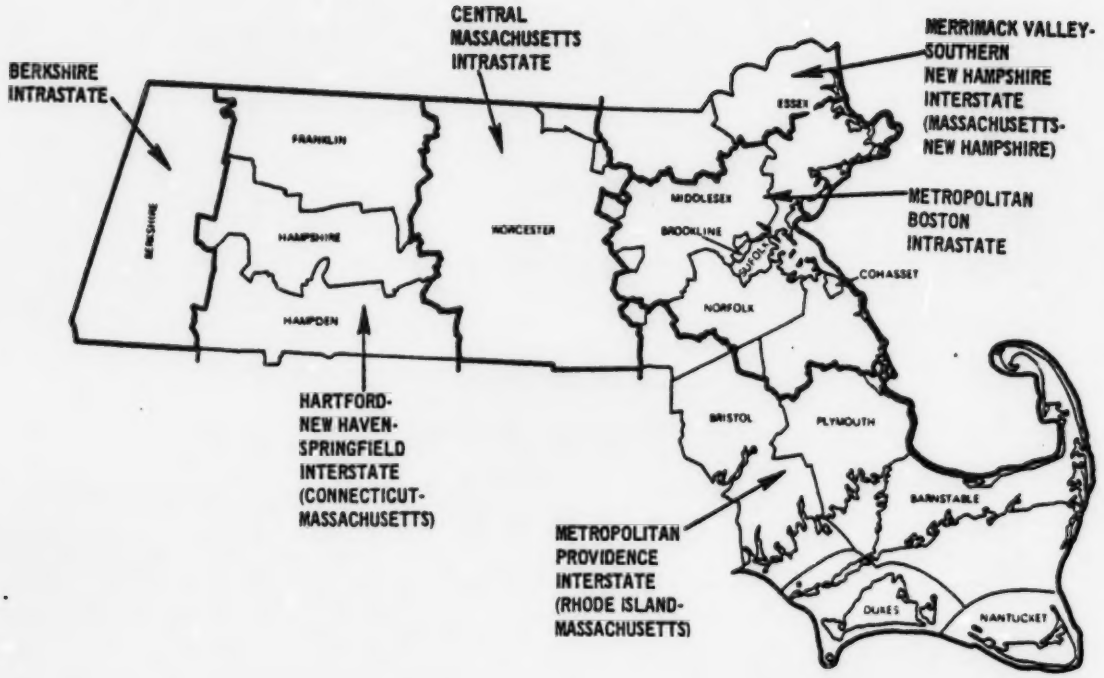

Figure 2-1 Air Quality Control Regions in Massachusetts

indicate that about half of the TSP and almost all of the SO_2 are emitted from fuel combustion sources. The highest TSP readings occurred in Worcester, where the two largest emitters of particulates (for the region) are located.

The Metropolitan Boston AQCR showed no violations for SO_2 in any of their 30 stations reporting in 1973, although six of 23 stations reported TSP violations. The Metropolitan Boston area has been given an 18-month extension to attain the secondary standards for SO_2 and TSP, and AQMA's have been proposed for both pollutants. Two-thirds of the TSP and almost 100 percent of the SO_2 can be attributed to fuel combustion sources. About 40 percent of the SO_2 can be attributed to power plants and about 45 percent to area sources, while nine percent and 46 percent of the region's TSP emissions can be attributed to power plants and area sources respectively. Most of the 1973 TSP violations occurred within the 13 cities making up the Boston core, in which the largest emitters of particulates are located.

The Metropolitan Providence interstate region monitors TSP in 33 locations and SO_2 in 32 locations. Of these only five TSP and six SO_2 stations are located in Massachusetts. For the entire region there were three monitors recording TSP violations and one reporting SO_2 violations in 1973. Although all violations were located in Rhode Island, proposed AQMA designations include counties in both states for both pollutants. Massachusetts contributes about two-thirds of the region's SO_2 emissions with about three-fourths of these emissions coming from power plants. Massachusetts and Rhode Island each contribute about the same amount of TSP to the region's total, with approximately half coming from fuel combustion sources. Massachusetts power plants contribute about 20 percent of the TSP to the states total for the region while area sources contribute about 30 percent.

In the Merrimack Valley - Southern New Hampshire Interstate AQCR, four of 30 stations reported TSP violations in 1973 while no violations were recorded for the 15 SO_2 reporting stations. Massachusetts contained eight TSP monitors, none of which recorded any violations in 1973. Eight of the SO_2 monitors were located in Massachusetts. Although the Massachusetts portion of the AQCR reported no violations, Essex County (which is contiguous with the Metropolitan Boston AQCR) has been proposed as an AQMA for both pollutants. Massachusetts contributes a little over a third to the

total TSP emissions for the region with about 37 percent of these emissions coming from area sources and none from power plants. Massachusetts also contributes about 30 percent of the SO_2 emissions to the total with about 70 percent of these emissions coming from area sources. Massachusetts point sources contribute about 20 percent of the TSP emissions and 25 percent of the SO_2 emissions to the state's total, for that region.

The Hartford - New Haven - Springfield Interstate AQCR contains 67 TSP monitors and 34 SO_2 monitors. Out of the ten TSP monitors located in Massachusetts, four showed violations in 1973, while none of the nine Massachusetts SO_2 monitors showed violations. For the same period Connecticut accounted for 7 stations violating TSP standards and one station violating SO_2 standards. Only two Massachusetts counties were proposed as AQMA's and only for particulates, while three Connecticut Counties have been proposed for both pollutants. Massachusetts contributes about 60 percent of the TSP to the region's total of which approximately 60 percent comes from fuel combustion sources. Massachusetts and Connecticut each account for about half of the region's SO_2. Approximately 50 percent of the SO_2 emissions from Massachusetts are related to power plant operations in the region. The Massachusetts stations recording 1973 TSP violations were located in Chicopee, Holyoke, and two in Springfield. While none of the largest TSP emitters are located in Chicopee, three (power plants) are located in Holyoke and one in Springfield.

2.3 BACKGROUND ON THE DEVELOPMENT OF THE CURRENT STATE IMPLEMENTATION PLAN

The control plan developed by the State of Massachusetts for the control of TSP and SO_2 contained four distinct parts. These parts controlled emissions from:

- Stationary fossil fuel combustion facilities
- Incinerators
- Industrial process operations
- Other sources, including motor vehicle and construction

Emissions were to be controlled by:

- Emission limitation for particulates
- Sulfur and ash limitations in fuels

- Visible emission limitations
- Prohibition of residual oil in certain facilities
- Other control divices in lieu of sulfur limitations

Table A-9 summarizes the regulations which are applicable to fuel combustion sources. It should be noted that the state has set stricter standards in areas of critical concern for both TSP emission limitations and maximum sulfur content. Massachusetts has further restricted the size of the facilities allowed to burn residual fuels. A maximum ash content of nine percent has been applied to all fuels.

Visible emissions are limited to Ringleman No. 1 or 20 percent opacity. Ringleman No. 1 may be exceeded for not more than six minutes per hour, but Ringleman No. 2 is not to be reached. The 20 percent opacity standard may be exceeded for not more than two minutes per hour as long as 40 percent opacity is not reached.

Modern control technology and standard operating procedures are used to control TSP from incinerators. Emission limitations for TSP and SO_2 were developed for industrial process sources. Traffic control plans and operating procedures will control TSP from motor vehicles and construction operations.

Massachusetts evaluated its control plan for each region for which there were sufficient data (Table A-10 and A-11). Results indicated that all federal secondary standards would be met on or before July, 1975 in every region, except the Metropolitan Boston (AQCR - 119). In May of 1974, EPA granted an 18 - month extension for compliance with the federal secondary standards in the Metropolitan Boston AQCR. In evaluating the control plan for each region, Massachusetts took what it believed to be the "worst case". This consisted of the worst ambient air quality readings or projections and the greatest projected growth in emissions.

2.4 SPECIAL CONSIDERATIONS

In an attempt to reduce the impact of fuel cost and shortages, Massachusetts has recently passed legislation mandating a relaxation of all ambient air quality standards to federal levels. Furthermore, all implementation

plan requirements must be relaxed as much as possible under this law. The distillate oil requirement has already been changed from 0.17 pounds per million BTU's to 0.28 pounds per million BTU's. This relaxation expires April 15, 1975. However, if no adverse trends in air quality are noted, it is believed that this relaxation will become permanent. Other changes in sulfur content and particulate limitations may be forthcoming.

In 1973 the state approved conversion to coal at four power plants within the state. They are:

- Salem Harbor — AQCR - 119
- Brayton Point (New England Power Co.) — AQCR - 120
- West Springfield — AQCR - 42
- Mt Tom — AQCR - 42

The conversion of the West Springfield plant was disapproved by EPA. Brayton Point (Unit No. 3) is still burning coal. An application by Salem Harbor to continue coal burning has been rejected by the state. Although the state is concerned with the possible increase in TSP, applications are being considered for Mt. Tom, West Springfield, and Montaup in Somerset.

3.0 AQCR ASSESSMENTS BASED ON SIP REVIEWS

The purpose of this section is to evaluate the available information for the State of Massachusetts and determine the feasibility of revisions to the SIP which would result in clean fuel conservation. The assessments will be made by AQCR addressing each type of fuel combustion source: power plants, large industrial and commercial/institutional sources, and area sources. The assessments must be made for each pollutant separately and are made on the basis of seven criteria: (1) 1973 air quality violations; (2) expected NAAQS attainment dates; (3) proposed Air Quality Maintenance Area (AQMA) designations; (4) total emissions; (5) portion of emissions from Massachusetts fuel combustion sources; (6) regional tolerance for emissions increase; and (7) pollutant priority classifications. Tables B-1 and B-2 tabulate these criteria for each AQCR for TSP and SO_2, respectively.

The AQCR's are grouped into good, marginal, and poor candidates for regulation relaxation based on the evaluation of all the presented information. Using available data, any AQCR which displays a 1973 air quality violation would probably be given a poor ranking. Conversely, a region with no violations, no proposed AQMA designations, low to moderate emissions, a positive emission tolerance, and/or a small fraction of emissions from Massachusetts fuel combustion sources would receive a good ranking. All other regions with varying indicators or incomplete or missing data would be evaluated separately and grouped in the appropriate class, most likely a marginal ranking.

The source type groups are evaluated separately using such variables for criteria as modeling results, emissions data from the SIP and/or NEDS, and air quality data.

3.1 BERKSHIRE AQCR 117

3.1.1 Regional Air Quality Assessment

Monitoring of SO_2 for 1973 indicates a potential to increase SO_2 emissions (Table A-5). A review of the Massachusetts control plan (Table A-11) for the region also indicated that there is a potential to increase SO_2 emissions. In addition to the above, the Berkshire region has been considered a good candidate to relax SO_2 regulations (Table B-2) since it has a priority III classification (Table A-1) and there are no proposed AQMA's within the region (Table A-1).

There were no violations of TSP within the region in 1973. However, air quality was recorded near the secondary standards (Table A-4) and calculations suggest only a minor increase in TSP can be permitted (Table A-4). Only about one-half of the TSP can be attributed to fuel combustion sources, with area sources accounting for a third of the region's total. The state control plan indicated that the secondary standards will just be met in 1975 (Table 3-1). Although there are no proposed AQMA designations for the area (Table A-1) a priority classification of II (Table A-1) combined with the above data have led to a poor candidate evaluation (Table B-1) for relaxation of any TSP regulations or strategies.

3.1.2 Power Plant Assessment

There are no power plants located in AQCR 117 and none will be in operation by 1975. Therefore, any tolerance for SO_2 could only be realized by relaxation of regulations pertaining to industrial, commercial, and institutional point sources as well as area sources.

3.1.3 Industrial/Commercial/Institutional Point Source Assessment

This category accounts for 22 percent of the TSP emissions and 55 percent of the SO_2 emissions in the AQCR (Table A-7 and 8). Although both 1973 air quality and the SIP evaluation show a potential to increase SO_2 emissions (Table A-11), they differ in magnitude. Application of existing fuel regulations indicates a reduction in SO_2 (Table 3-2) for those nine

significant sources listed in Table D-2 between 1970 and 1975. If the fuel regulations controlling these sources were to be rescinded:

A) the resultant emissions may still be below the allowable, according to the air quality calculations

B) the resultant emissions may exceed the allowable, according to the SIP calculations.

Although this category of sources may not increase their TSP emissions as a whole, individual point sources may be able to increase their TSP emissions if it can be shown that there would be no adverse effect on air quality.

3.1.4 Area Source Assessment

Area sources contribute 31 percent of the TSP emissions and 44 percent of the SO_2 emissions (Table 7 and 8) to the region's total. Since a possible regional increase in area wide SO_2 emissions may be accepted, additional SO_2 emissions from this category would seem possible.

3.2 CENTRAL MASSACHUSETTS - AQCR 118

3.2.1 Regional Air Quality Assessment

All monitoring sites within the AQCR recorded SO_2 concentrations below the standards in 1973 (Table A-5). Based on these readings, there is a potential to increase the SO_2 emissions. The Massachusetts control plan for the region will reduce SO_2 emissions below the point required by the regulations (Table 3-2). Using the same criteria (Table B-2) as in the previous case (AQCR 117), the Central Massachusetts AQCR was given a good candidate ranking for possible modification of SO_2 regulations.

Since four of nine monitors recorded TSP violations in 1973 (Table A-4), there is no potential to increase emissions based on this air quality data. SIP results indicate that the secondary standard will be met with little potential for increasing emissions (Table 3-1). Therefore, Central Massachusetts must be considered a poor candidate for reduction TSP regulations (Table B-1).

3.2.2 Power Plant Assessment

There are no power plants located in AQCR 118 and none will be in operation by 1975. Therefore, any tolerance for SO_2 could only be realized by relaxation of regulations pertaining to industrial, commercial and institutional point sources as well as area sources.

3.2.3 Industrial/Commercial/Institutional Point Source Assessment

This category accounts for about 30 percent of the SO_2 emissions from fuel combustion. Although there is a potential to increase SO_2 emissions (Table A-11) the 23 significant SO_2 emitters (Table D-2) will collectively reduce their SO_2 contribution between 1970 and 1975. Total relaxation of the sulfur regulations for these significant sources will bring the SO_2 emissions up to their allowable maximum according to the SIP (Table 3-2). However, air quality data (Table A-5) may possibly allow further increases in SO_2 emissions (in addition to the relaxation mentioned above).

Since this category only accounts for about 10 percent of the total TSP emissions (Table A-7) for the region, modification of the regulations may be possible under 1973 air quality conditions (Table A-4). That is, individual sources may be able to increase their TSP emissions, if it can be shown that air quality will not be adversely affected.

3.2.4 Area Source Assessment

Area sources account for about 34 percent of the region's TSP emissions and 67 percent of the SO_2 emissions. Since there seems to be an SO_2 emission tolerance (Table A-11) for the entire region, area sources may increase their emissions without exceeding the standards. As with the industrial sources, there is no apparent tolerance to increase TSP emissions (area sources account for about 34 percent of the region's total).

3.3 METROPOLITAN BOSTON AQCR 119

3.3.1 Regional Air Quality Assessment

This region has been given a priority I classification for SO_2 and TSP and has been granted an 18-month extension to meet the Federal secondary

standards for both pollutants. Although 1973 air quality (Table A-5) shows a potential to increase SO_2 emissions, this region must be considered a poor candidate for relaxation of SO_2 regulations (Table B-2). There were six monitoring stations recording violations of the TSP standards in 1973 (Table A-4) and therefore a reduction is needed to meet the standards. Table B-1 shows the criteria which led to a poor candidate ranking for TSP emission regulation relaxation.

3.3.2 Power Plant Assessment

The Metropolitan Boston AQCR has 10 power plants which range in size from 12.5 MW to 760 MW (Table C-1). One new unit is expected to be on line in 1975 which will add 587 MW to the AQCR's total (Table C-2). As of now, no plants are scheduled to burn coal in 1973; although the Salem Harbor plant was granted permission to burn coal in 1973. An application to continue coal burning at Salem Harbor has been rejected. However, modeling results indicate that is Salem Harbor switched to 2.5 percent sulfur coal with an ash content of 15 percent, the standards would not be violated (Table C-4).

Although existing power plants are required to reduce their SO_2 emissions between 1970 and 1975 under existing regulations, relaxation of both SO_2 and TSP regulations based on existing criteria for the entire AQCR does not seem possible. However, if modeling results show relaxation is possible on a case by case basis, there may be some potential for a clean fuel savings

3.3.3 Industrial/Commercial/Institutional Point Source Assessment

These sources account for only 10 percent of the region's TSP emissions and only 11 percent of the SO_2 emissions (Tables A 7 and 8). Emissions from this category are emitted from relatively few significant sources (i.e. six for TSP and seven for SO_2, Table A-6). Since these fuel combustion sources add so little to the region's total emissions, existing regulations have little impact on emission reduction for the region from these sources (Table 3-1 and 2). However, since there are relatively few significant sources air quality impacts may be substantial in the area surrounding these

sources, if relaxation of regulations occurred. If air quality monitoring continues to show no violations of the SO_2 standards, modeling of these large sources may show a potential for relaxations of regulations on a case by case basis.

3.3.4 Area Source Assessment

This category is the largest emitter of SO_2 and TSP in the region. Since the region is a poor candidate for relaxation of both TSP and SO_2 regulations, area sources would be a prime target for further emission reductions (from an emission standpoint).

3.4 METROPOLITAN PROVIDENCE AQCR 120

3.4.1 Regional Air Quality Assessment

Air quality monitoring for 1973 indicated that the entire AQCR must reduce its TSP emissions, and its SO_2 emissions (Table A-4 and 5). Combined with the other criteria, listed in Tables B-1 and 2, both the Massachusetts and Rhode Island protions of the region must be given poor candidate rankings. Although Massachusetts contributed about two-thirds of the SO_2 emissions and about one-half of the TSP emission to the region's total, there were no violations of either pollutant standard recorded in Massachusetts. Therefore, slight modification of the Massachusetts' regulations may be possible if it can be shown that no adverse impact would result in any section of the AQCR.

3.4.2 Power Plant Assessment

There are seven oil fired power plants located in the Massachusetts portion of this AQCR, four of which are known to have the capability to burn coal (Table C-1). These plants accounted for 21 percent of the state's TSP contribution to the AQCR and 77 percent of their SO_2 contributions (Tables A-7 and 8). One new unit of 560 MW is due to begin operations in 1975 in Sandwich, Massachusetts (Table C-2). The present regulations will require a reduction in SO_2 and will allow a increase in TSP emissions (Table C-3). Monitoring results indicate that switching Unit 3 at the New England Power Plant Company's plant in Somerset to 2.5 percent sulfur and

an ash content of 15 percent will not violate the standards at the New England Power Plant site even with the contribution from Montaup's plant (with the same switch). However, the contributions of any modeled New England Power Plant switch will exceed the standards at Montaup's site if the Montaup plant also switches (Table C-4)

3.4.3 Industrial/Commercial/Institutional Point Source Assessment

These sources contribute only seven percent of the TSP and three percent of the SO_2 to the state's total for the AQCR (Table A-7 and 8). In addition to the power plants there are only two significant sources for each pollutant (Table A-6). Although the region as a whole may not increase its TSP and SO_2 emissions, these particular sources may have a potential to increase their emissions without adversely effecting air quality due to their small contribution to the total regional emission inventory. Evidence of this exists in Tables 3-1 and 2 which show that applying existing regulations to the sources mentioned above will only account for slight TSP and SO_2 reductions between 1969 and 1975. A case by case study would have to be conducted to insure maintenance of air quality standards before fuel switching occurred.

3.4.4 Area Source Assessment

These nonpoint sources contribute 31 percent of the state's total TSP emissions in the region and 20 percent of the SO_2 emissions. Any relaxation of the standards for these sources is not suggested in view of the air quality assessment.

3.5 MERRIMACK VALLEY - SOUTHERN NEW HAMPSHIRE AQCR 121

3.5.1 Regional Air Quality Assessment

Since there were no air quality violations for either pollutant in the Massachusetts section of the region (Tables A-4 and 5), an emission increase may be possible.

3.5.2 Power Plant Assessment

There are no power plants operating in the Massachusetts portion of this region and none are expected by 1975. Therefore, any tolerance of emissions must be determined by examining the industrial, commercial and institutional point sources as well as the area sources.

3.5.3 Industrial/Commercial/Institutional Point Source Assessment

This category accounts for 19 percent of Massachusetts' contribution of TSP to the region and 27 percent of the SO_2 emissions (Table A-7 and 8). Under the existing regulations the significant sources will reduce both their TSP and SO_2 emissions between 1970 and 1975 (Table 3-1 and 2). However, since these reductions contribute little to the regional totals and since there were no violations in Massachusetts in 1973, relaxation of standards pertaining to these sources may be possible, if it can be proven that they will not adversely affect air quality.

3.5.4 Area Source Assessment

The Massachusetts area sources are the largest contributors to both TSP and SO_2 emissions in either state, contributing about 14 percent of the regions total TSP emissions and 21 percent of the SO_2 emissions (Tables A-7 and 8). Therefore, relaxation of regulations for this category does not seem possible.

3.6 HARTFORD - NEW HAVEN - SPRINGFIELD AQCR 42

3.6.1 Regional Air Quality Assessment

Air quality monitoring for 1973 indicated a reduction in TSP and SO_2 will be needed to meet the standards. Including the other factors in Table B-1 and 2, a poor candidate ranking for possible emission regulation relaxation was assigned for both pollutants. However, it should be noted that no Massachusetts SO_2 monitoring station recorded any violations, and no proposed AQMA's were designated in Massachusetts for SO_2.

3.6.2 Power Plant Assessment

There are four power plants located within the state's portion of the AQCR, each of which has the ability to burn coal. Three of the four

TABLE 3-1

MASSACHUSETTS PARTICULATE SUMMARY BY AQCR

AQCR Name	AQCR No.	Candidate Ranking	Necessary Emission[c] Reduction for Entire AQCR Based on Air Quality (10^3T/Yr)	SIP Required Emission[d] Reduction (for State) to Meet Standards (10^3T/Yr)	SIP Projected[e] Emission Reduction (for State) 1975 (10^3T/Yr)	%Contribution of State's Fuel Combustion Emissions to Total AQCR Emissions	Emission Tolerance (see Table A-10) (10^3T/Yr)	Power Plant Emission Reduction Under Existing Regulations (10^3T/Yr)	Significant Point Source Emission Reduction Under Existing Regulations (10^3T/Yr)	Area Sources Emission Reduction Under Existing Regulations[b] (10^3T/Yr)
Berkshire	117	Bad	-0.1	1.5	1.5	53	+0.1	-	+ 0.5	NA
Central Massachusetts	118	Bad	6.0	6.2	6.9	46	+0.6	-	+ 0.7	NA
Metropolitan Boston	119	Bad	22.8	24.6	19.0	66	-24.6	- 4.3	+ 0.3	NA
Metropolitan Providence	120	Bad	19.9	NA	1.9[a]	27	- 5.5	- 4.5	+0.04	NA
Merrimack Valley Southern New Hampshire	121	Bad	14.6	NA	NA	21	- 2.1	-	+ 0.4	NA
Hartford - New Haven - Springfield	042	Bad	48.7	NA	NA	37	-24.9	+11.2	+ 0.3	NA

a. Based on 1969 SIP data.

b. Data not available for this analysis. However, it felt that the reduction will be of insignificant magnitude.

c. Total NEDS emissions minus allowable emissions based on 1973 air quality.

d. Total NEDS emissions minus allowable emissions based on SIP data.

e. Total NEDS emissions minus projected 1975 emissions after controls.

TABLE 3-2

MASSACHUSETTS SULFUR DIOXIDE SUMMARY BY AQCR

AQCR Name	AQCR No.	Candidate Ranking	Necessary Emission[c] Reduction for Entire AQCR Based on Air Quality (10^3T/Yr)	SIP Required Emission[d] Reduction (for State) to Meet Standards (10^3T/Yr)	SIP Projected[e] Emission Reduction (for State) 1975 (10^3T/Yr)	%Contribution of State's Fuel Combustion Emissions to Total AQCR Emissions	Emission Tolerance (see Table A-10) (10^3T/Yr)	Power Plant Emission Reduction Under Existing Regulations (10^3T/Yr)	Significant Point Source Emission Reduction Under Existing Regulations (10^3T/Yr)	Area Sources Emission Reduction Under Existing Regulations (10^3T/Yr)
Berkshire	117	Good	-39.7	5.5	7.9	98	+39.7	--	+4.0	+2.4/-9.0[f]
Central Massachusetts	118	Good	-38.0	16.2	23.5	97	+38.0	--	+7.3	+10.2
Metropolitan Boston	119	Bad	-189.0	253.4	227.5	98	+189.0	+84.4	+5.2	+63.8
Metropolitan Providence	120	Bad	106.3	NA	92.4[a]	69	-33.8	+43.4	+0.3	+11.6
Merrimack Valley Southern New Hampshire	121	Bad	60.5	NA	NA	29	+19.4	--	+4.0	+ 8.1
Hartford - New Haven - Springfield	042	Bad	155.02	NA	NA	51	-62.1	+30.3	+5.5	+10.6

a. Based on 1969 data.

c. Total NEDS emissions minus allowable emissions based on 1973 air quality.

d. Total NEDS emissions minus allowable emissions based on SIP data.

e. Total NEDS emissions minus projected 1975 emissions after controls.

f. First value is reduction due to statewide 1% sulfur regulation. Second value is reduction (increase since less than zero) due to 2.2% S regulation adopted by state for Region 117.

plants are located in Holyoke where two monitors recorded TSP violations. These four plants account for 35 percent of the state's contribution of TSP to the regional total and 48 percent of the state's SO_2 contribution. These sources account for about 25 percent of the regional SO_2 emissions and about 21 percent of the regional TSP emissions (Tables A-7 and 8). Modeling results indicate that both the Mt. Tom plant and the West Springfield plant may be able to burn 2.5 percent sulfur fuel without exceeding the standards. According to the air quality information (Tables A-4 and 5) a reduction in TSP and SO_2 (Tables A-4 and 5) will be necessary for emissions to reach their allowable limits. Therefore, relaxation of regulations may not be possible unless a case by case review indicates otherwise.

3.6.3 Industrial/Commercial/Institutional Point Source Assessment

These Massachusetts sources account for 16 percent of the state's contribution to the region's total for TSP and 19 percent of SO_2. The significant sources listed in Table A-6 will account for only a minor reduction in TSP and SO_2 between 1970 and 1975. Therefore, it seems likely that relaxation of the existing regulations in this area may not adversely effect regional air quality although localized hotspots may occur.

3.6.4 Area Source Assessment

Area sources contribute only 10 percent of the TSP emissions to the Massachusetts total for the region and about six percent to the regional totals (Table A-7). These same sources contribute 32 percent of the states total SO_2 emissions in the AQCR and a little over 15 percent of the regional SO_2 emissions. Since there were no SO_2 violations in Massachusetts in 1973 and no proposed AQCR designations, there is a possibility that the SO_2 emissions from this category may be increased. It does not seem possible that relaxation of the TSP regulations would be possible in this category.

3.7 HARVARD MODELING STUDY

3.7.1 Regulations Affecting SO_2 Emissions

3.7.1.1 Regulation 5.1.1 (Requires the use of 0.5% sulfur content residual oil used in Boston and 12 surrounding cities and towns.)

This regulation is generally needed in the Metropolitan Boston District Core Area. The analysis shows that the majority of the SO_2

concentrations observed in the Boston central region result from emissions in the core towns; these emissions must be controlled in order to achieve compliance with the standard. (On the other hand, it is not necessary to limit the sulfur content of residual oil to 1.0% in the outer towns in the Boston area. The annual standards could be met with the use of 1.5% sulfur content residual oil in the outer towns).

Although Regulation 5.1.1 is generally necessary for the achievement of standards in the core area it could be modified in two ways. Residual oil with 1.0% sulfur content could be used in a six-month summer period by process and power generation users. Also, the largest facilities could use 1.0% sulfur oil on an intermittent basis throughout the year, if adequate monitoring and forecasting systems were in operation. Both of these modifications to Regulation 5.1.1 could be implemented, consistent with attainment of the SO_2 standards.

The region of applicability of Regulation 5.1.1 was also investigated in the study. The present choice of towns in the zone of application is judged to be appropriate, and no changes in this zone are recommended.

The relative effectiveness of Regulation 5.1.1 on all 102 cities and towns in the Metropolitan Boston District is summarized in Table E-1. This table shows that the regulation has major effectiveness in 17 cities and towns (in and around the core area), moderate effectiveness in 7 additional towns (adjacent to the core area), minor effectiveness in 14 towns (more distant from the core area) and no significant effectiveness in 64 additional towns (at the outer parts of the district).

3.7.1.2 Regulation 5.1.2 (Requires the use of 1.0% sulfur content residual oil throughout the state, except for the Boston Region Core [Boston and 12 adjoining towns])

The effectiveness of this regulation must be described separately for different areas. With reference to Table F-2, the following findings can be stated:

3.7.1.2.1 Metropolitan Boston District AQCR 119

Regulation 5.1.2 has moderate or major effectiveness in 8 towns,

minor effectiveness in 26 towns, and no significant effectiveness in 68 towns. The use of 1.5% sulfur oil outside the 13 core towns were consistent with meeting the SO_2 standards throughout the District.

3.7.1.2.2 Southeastern Massachusetts District AQCR 120

The regulation has moderate or major effectiveness in 13 towns. This results directly from control of the major electric-generating facilities in the District. Generally, 2.0% sulfur oil could be used throughout the District, consistent with meeting standards. However, the impact of the largest fuel users in the District would have to be studied in greater detail before they could be permitted to change to 2.0% sulfur oil.

3.7.1.2.3 Central Massachusetts AQCR 118 - Pioneer Valley District AQCR 42

Regulation 5.1.2 is moderately effective in the core cities in these Districts, and has minor effectiveness in the immediately surrounding towns. The regulation has no significant effectiveness in the remaining towns in the Districts, because SO_2 levels were already low in these towns, in the absence of the regulation.

3.7.1.2.4 Merrimack Valley AQCR 121 - Bershire District AQCR 117

Regulation 5.1.2 has only minor effectiveness in the principal towns in these two Districts, and no significant effectiveness in the remainder of the towns. These districts could be placed on a 2% sulfur oil allocation, without risk of violating standards.

3.7.1.3 Regulation 5.1.3 (Requires the use of distillate oil with sulfur content not exceeding 0.3%, everywhere in the state)

Table F-3 illustrates the principal finding concerning the sulfur limitations in distillate oil: the regulation has no significant effectiveness anywhere in the state, assuming that 0.5% sulfur distillate oil was used by all area sources prior to application of the regulation. This results because the total SO_2 emissions from distillate oil combustion are significantly lower than the emissions associated with residual oil combustion. (However, an important limitation in the model analysis must be cited here. The model calculation grid is 4 x 4 km, and smaller scale variations in pollutant concentration are not treated by the model. It is likely, for example, that SO_2 emissions from distillate oil combustion

contribute importantly to the observed SO_2 concentrations at the Kenmore Square observing station in Boston. This would not be noted by the model if all the important emission sources were confined to a very small area. The model calculations demonstrate that the larger regional scale impact of the distillate oil sulfur limitation is not important, but the calculations do not treat the microscale cases.)

The Massachusetts Department of Public Health has recently proposed changing the sulfur limit in distillate oil to o.5%. The results presented here indicate that this change can be made without significant regional impact on SO_2 concentrations in the state.

3.7.1.4 Regulation 5.4.1 (Requires the use of fuel having ash content of no more than 9% of dry weight. This regulation is often interpreted as requiring a change from coal to oil fuel in the state).

In Massachusetts the differences in fuel type and quality and user characteristics cause an increase in SO_2 emissions when the change from coal to oil fuel is carried out on an equivalent BTU basis. Thus, the impact of Regulation 5.4.1 upon SO_2 concentrations is negative. This is illustrated in Table F-4, which shows that the regulation has no significant (positive) impact upon SO_2 concentrations.

3.7.1.5 All SO_2 Regulations (includes the impact of Regulations 5.1.1, 5.1.2, 5.1.3 and 5.4.1)

Table F-5 summarizes the effectiveness of the total SO_2 regulation set upon the entire state. Outside the Metropolitan Boston District, all of the effectiveness is associated with Regulation 5.1.2. In the Boston District both Regulations 5.1.1 and 5.1.2 are effective in several towns. Regulation 5.1.3 is not effective in any town, and Regulation 5.4.1 has negative impact.

The SO_2 regulations generally have important effectiveness in the Metropolitan Boston District, and in part of the Southeastern District (associated with the power plants). They have some effectiveness in the central cities in the Central Massachusetts and Pioneer Valley Districts, and little effectiveness elsewhere in the state.

3.7.2 Regulations Affecting Particulate Emissions

3.7.2.1 Regulation 5.4.1 (Limits the ash content of fuel to 9% by weight)

This regulation has caused a major shift away from coal burning in the state, and it has had important effectiveness throughout the state in reducing or elimination of coal use has major effectiveness in all districts except the Merrimack Valley and Berkshire Districts, where a smaller number of coal-burning facilities were operating, and where existing particulate levels have been relatively low.

Although the elimination of coal, particularly in small burners, has been very effective in reducing particulate concentrations, this result does not argue against the use of coal in new, large facilities where adequate particulate collection devices can be operated. In view of the lower SO_2 emissions associated with coal burning, and of the availability of coal as the principal domestic energy resources, the use of coal in new power stations built in Massachusetts should be considered.

3.7.2.2 Regulation 2.5.1 - relative to fossil fuel utilization facilities. (Evaluated by the assumption that particulate emissions from these facilities are reduced to 80% of existing levels, for facilities located in the critical areas of concern).

Table F-7 shows that this regulation has no significant regional effectiveness in any town in the state. As discussed above, microscale impacts can occur, not noted by the model calculations. These results suggest that the critical area of concern designation is not necessary for fossil fuel utilization facilities; all facilities in the state can effectively be controlled by a single emission limit.

3.7.2.3 Regulation 2.5.2 - relative to large process sources of particulate emissions. (evaluated by the assumption that all large process sources in the state are reduced to the emission limit of 25.7 lbs/hour, corresponding to 200,000 lbs/hour processes in new facilities, and in existing facilities in the critical areas of concern. This evaluation illustrates the possible reductions in particulate concentrations resulting from control of individual large facilities).

Table F-8 illustrates that the control of individual large facilities has major and moderate effectiveness in a number of cities and towns throughout the state. The model calculations indicate no effectiveness of this approach

in the Metropolitan Boston District. However, the point source emission inventory was available only for the 30 inner towns in the District. If the point source inventory were available for the outer 72 towns, it is likely that some substantial reductions would have been found in this District also.

APPENDIX A

State Implementation Plan Background

TABLE A-1 MASSACHUSETTS AIR POLLUTION CONTROL REGIONS

Air Quality Control Region	Federal Number	Priority Classification[a]			Population 1975 (Millions)	Proposed AQMA Designations[b]	
		Particulates	SO_x	NO_x		TSP Counties	SO_x Counties
Berkshire	117	II	III	III	0.16	(0)	(0)
Central Massachusetts	118	I	II	III	.68	(1) Worcester	(0)
Metropolitan Boston	119	I	I	III	4.04	(3) Suffolk, Middlesex, Norfolk	(3) Suffolk, Norfolk, Middlesex
Metropolitan Providence (R.I.)	120	I	I	III	1.60	(3) Plymouth, Kent,[D] Providence[D]	(3) Plymouth, Kent[D], Providence[D]
Merrimack Valley Southern New Hampshire (N.H.)	121	I	I	III	.68	(1) Essex	Carlisle and Boxford are included in the Boston AQMA
Hartford - New Haven - Springfield (CONN.)	42	I	I	III	2.54	(5) Hampden, Hampshire, Hartford,[C] New Haven[C], Middlesex[C]	(3) Hartford[C], New Haven[C], Middlesex[C]

[a]Criteria Based on Maximum Measured (or Estimated) Pollution Concentration in Area

Priority	I	II	III
	Greater than	From - To	Less than
Sulfur oxide:			
Annual arithmetic mean	100	60-100	60
24-hour maximum	455	260-455	260
Particulate matter:			
Annual geometric mean	95	60-95	60
24-hour maximum	325	150-325	260

[b]Federal Register, July, 1974 counties showing potential for NAAQS violations due to growth.

[C]Connecticut counties

[D]Rhode Island counties

TABLE A-2
ATTAINMENT DATES[c]

AQCR #	Name	Particulates Attainment Dates		Sulfur Dioxide Attainment Dates		Nitrogen Oxides Attainment Dates
		Primary	Secondary	Primary	Secondary	
117	Berkshire	7/75	7/75	a	a	a
118	Central Massachusetts	7/75	7/75	a	7/75	a
119	Metropolitan Boston	7/75	b	7/75	b	a
120[e]	Metropolitan Providence	7/75	7/75	7/75	7/75	a
121[e]	Merrimach Valley - Southern New Hampshire	7/75	7/75	7/75	7/75	a
42[e]	Hartford - New Haven - Springfield	7/75	7/75	a	7/75	a

[a] Air quality levels presently below standards
[b] 18 - month extension granted
[c] as of May 1974
[e] interstate

TABLE A-3 MASSACHUSETTS AMBIENT AIR QUALITY STANDARDS

All concentrations in ugms/m^3

		Total Suspended Particulate		Sulfur Oxides			Nitrogen Dioxide
		Annual	24-Hour	Annual	24-Hour	3-Hour	Annual
Federal (Nov. 1972)	Primary	75(G)	260[a]	80(A)	365[a]	---	100(A)
	Secondary	60(G)	150[a]	---	--	1300[a]	100(A)
State		75(G)	260[a]	80(A)	365[a]	---	----

[a]Not to be exceeded more than once per year

(A) Arithmetic mean

(G) Geometric mean

TABLE A-4 MASSACHUSETTS AQCR AIR QUALITY STATUS, 1973 TSP[a]

AQCR Name	AQCR No.	No. Stations Reporting	TSP Concentration (ug/m^3) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	Number of Stations Violating Ambient Air Quality Standards: Primary Annual	Primary 24-Hr[c]	Secondary Annual	Secondary Annual %	Secondary 24-Hr[c]	Secondary 24-Hr %	% Reduction Required to Meet Standards[d]
Berkshire	117	6	55	190	147	0	0	0	0	0	0	-03
Central Massachusetts	118	9	69	348	303	0	1	2	3	4	6	+56
Metropolitan Boston	119	23	92	423	301	1	2	2	9	6	26	+67
Metropolitan Providence	120[b,e]	33	86	543	206	1	0	2	6	3	9	+45
Merrimack Vly. So. N.H.	121[b,f]	30	60	209	197	0	0	0	0	4	13	+28
Hartford - New Haven - Springfield	42[b]	27	117	420	396	1	1	2	7	4	15	+70

[a] 1973 air quality data in National Air Data Bank as of June 7, 1974.

[b] Interstate.

[c] Violations based on 2nd highest reading at any station.

[d] Formula: $\left[\left(\frac{\text{2nd Highest 24 Hr - 24-Hr Secondary Standard}}{\text{2nd Highest 24-Hr - Background}}\right) \times 100, \left(\frac{\text{Annual - Annual Secondary Standard}}{\text{Annual - Background}}\right)\right] \times 100$

[e] All noted values located in R.I.

[f] All noted values located in N.H.

TABLE A-5 MASSACHUSETTS AQCR AIR QUALITY STATUS, 1973 SO_2[a]

AQCR Name	AQCR No.	No. Stations 24 Hr	Reporting Cont.	SO_2 Concentration ($\mu g/m^3$) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	Number of Stations Exceeding Ambient Air Quality Standards: Primary Annual	Primary Annual %	Primary 24-Hr[c]	Primary 24-Hr %	Secondary 3-Hr[c]	Secondary 3-Hr %	% Reduction Required to Meet Standards[d]
Berkshire	117	6	1	24	235	99	0	0	0	0	---	---	-233
Central Massachusetts	118	9	1	46	319	178	0	0	0		---	---	- 74
Metropolitan Boston	119	23	7	51	214	180	0	0	0	0	---	---	- 57
Metropolitan Providence	120[b,e]	28	4	100	620	183	1	4	1	4	---	0	+ 20
Merrimack Vly. So. N.H.	121[b]	13	2	51	248	141	0	0	0	0	---	0	- 57
Hartford - New Haven - Springfield	42[b]	25	9	32	992	---	0	0	1	4	---	1	+ 63[f]

[a] 1973 air quality data in National Air Data Bank as of June 7, 1974

[b] Interstate

[c] Violations based on 2nd highest reading at any station.

[d] Formula:

$$\frac{\text{2nd Highest 24-Hr} - \text{24-Hr Standard}}{\text{2nd Highest 24-Hr}} \times 100, \quad \frac{\text{Annual} - \text{Annual Standard}}{\text{Annual}} \times 100$$

[e] All excessive values located in R.I.

[f] 2nd highest unavailable, therefore, highest value used to calculate roleback

TABLE A-6 MASSACHUSETTS FUEL COMBUSTION SOURCE SUMMARY

AQCR Name	AQCR No.	Power Plants[a]	Other Fuel Combustion Point Sources[b] TSP	Other Fuel Combustion Point Sources[b] SO_2	Area Sources[c]	Total Emissions[d] (10^3 tons/year) TSP	Total Emissions[d] (10^3 tons/year) SO_2	% Emissions from Mass. Fuel Combustion Sources TSP	% Emissions from Mass. Fuel Combustion Sources SO_2
Berkshire	117	0	8[f]	9[f]	32	2.89	17.04	53	98
Central Massachusetts	118[h]	0	15[g]	23[g]	60	10.56	45.72	43	97
Metropolitan Boston	119	10	6[g]	7[g]	100	36.76	331.63	66	98
Metropolitan Providence	120[e]	7	2[f]	2[f]	60	26.66	241.29	27	69
Merrimack Valley Southern New Hampshire	121[e]	0	8[f]	19[g]	20	19.92	114.00	21	29
Hartford - New Haven - Springfield	42[e]	4	2[f]	14[f]	43	59.40	191.47	37	51

[a] Mass. power plants only

[b] Mass. plants in addition to power plants

[c] Mass. townships and cities

[d] AQCR total

[e] interstate

[f] All significant point sources when combined with power plants, contribute at least 90% of the total emissions from fuel combustion point sources.

[g] All significant point sources, when combined with power plants contribute less than 90% of the total emissions from fuel combustion point sources.

[h] The power plant listed in NEDS ceased operations at the end of 1971.

TABLE A-7 MASSACHUSETTS EMISSION SUMMARY[a], TSP

AQCR Name	AQCR	Total (10^3 tons/yr)	%[b]	Electricity Generation (10^3 tons/yr)	%[c]	Industrial/Commercial/ Institutional Point Source (10^3 tons/yr)	%[c]	Area Source (10^3 tons/yr)	%[c]
Berkshire	117	2.89	2	0	0	0.63	22	0.89	31
Central Massachusetts	118	10.56	7	0	0	1.02	10	3.55	34
Metropolitan Boston	119	36.76	24	3.42	9	3.78	10	16.98	46
Metropolitan Providence	120								
	Mass.	12.25	8	2.53	21	0.80	7	3.81	31
	R.I.	14.41	9	0.47	3	1.16	8	4.79	33
	Total	26.66	17	3.00	11	1.96	7	8.60	32
Merrimack Vly.-So. N.H.	121								
	Mass.	7.34	5	0	0	1.36	19	2.74	37
	N.H.	12.58	8	0.74	6	1.01	8	2.56	20
	Total	19.92	13	0.74	4	2.37	12	5.30	27
Hartford - New Haven - Springfield	42								
	Mass.	35.57	23	12.56	35	5.60	16	3.65	10
	Conn.	23.83	15	2.96	12	1.34	6	9.78	41
	Total	59.40	38	15.52	26	6.94	12	13.43	23
	Total	156.19	101	22.68	15	16.7	11	48.75	31

[a]Emissions in data bank as of June 27, 1974

[b]% of total for all AQCRS

[c]% of total for AQCR

TABLE A-8 MASSACHUSETTS EMISSION SUMMARY[a], SO_2

AQCR Name	AQCR	Total (10^3 tons/yr)	%[b]	Electricity Generation (10^3 tons/yr)	%[c]	Industrial/Commercial/ Institutional Point Source (10^3 tons/yr)	%[c]	Area Source (10^3 tons/yr)	%[c]
Berkshire	117	17.04	2	0	0	9.30	55	7.43	44
Central Massachusetts	118	45.72	5	0	0	13.79	30	30.62	67
Metropolitan Boston	119	331.63	35	137.18	41	38.05	11	150.04	45
Metropolitan Providence	120								
	Mass.	168.80	18	129.20	77	4.43	3	33.60	20
	R.I.	72.49	8	23.65	33	17.51	24	29.35	40
	Total	241.29	26	152.85	63	21.94	9	62.95	26
Merrimack Vly.-So. N.H.	121								
	Mass.	34.05	4	0	0	9.10	27	23.98	70
	N.H.	79.95	8	52.10	65	12.04	15	16.29	20
	Total	114.00	12	52.10	46	21.14	19	40.27	35
Hartford - New Haven - Springfield	42								
	Mass.	98.50	10	46.82	48	18.98	19	31.49	32
	Conn.	92.97	10	50.36	54	5.77	6	32.57	35
	Total	191.47	20	97.18	51	24.75	13	64.06	33
Total		941.15	100	439.31	47	128.97	14	355.37	38

[a] Emissions in data bank as of June 27, 1974

[b] % of total for all AQCRS

[c] % of total for AQCR

TABLE A-9 MASSACHUSETTS REGULATIONS

Particulate Emissions		Sulfur Dioxide (controlled by sulfur content of fuels)	
Existing Sources	New Sources	Distillate Fuel Oil (maximum sulfur content)	Residual Fuel Oil and Coal[e] (maximum sulfur content)
0.15 lbs/10^6 BTU[a]	Between 3 and 250 10^6 BTU/Hr: 0.10 lbs/10^6 BTU[b] Greater than 250 10^6 BTU/Hr: 0.05 lbs/10^6 BTU	0.17 lbs/10^6 BTU[c] (.3 % sulfur)	0.55 lbs/10^6 BTU[d] (all AQCR's except 117 Berkshire) (1.0% sulfur for oil) (0.72% sulfur for coal) 2.2% sulfur (AQCR 117 only)[f]

[a] 0.12 lbs/10^6 BTU in critical areas of concern (See Regulation 2.5.0)

[b] This regulation also governs sources using equipment to control sulfur oxides

[c] This regulation has been relaxed to 0.28 lbs/10^6 BTU until April 15, 1975.

[d] 0.28 lb/10^6 BTU in Metropolitan Boston core cities (See Regulation 5.2.1)

[e] Facilities having an input capacity of less than 3 x 10^6 BTU (6 / 10^6 in Metropolitan Boston) are prohibited from burning residual fuel oil. The more strigent limitation for Metropolitan Boston is now under review by EPA.

[f] Passed by State but not yet approved by EPA.

TABLE A-10 REQUIRED EMISSION REDUCTIONS FOR TSP

	SIP							
AQCR	Maximum Air Quality Concentration ugm/m^3	Emissions (10^3 tons)	Allowable[a] Emissions (10^3 tons)	1975 Estimated Emissions After Controls (10^3 tons)	Percent Reduction Required Based On 1973 AQ Data	NEDS Emissions (10^3 tons)	AQCR Allowable Emissions[f] (10^3 tons)	Emission Tolerance (10^3 tons)
117	87	2.57	1.35	1.35	-03	2.89	2.98	+ 0.09[d]
118	110	13.13	4.90	4.26	+56	10.56	4.65	+ 0.64[b]
119	97	26.09	12.14	17.78	+62	36.76	13.97	-24.62[c]
120	not available	12.22[e]	not available	10.4[e]	+45	12.25	6.74	- 5.51[d]
121	—— not available ——				+28	7.34	5.29	- 2.05[d]
42	—— not available ——				+70	35.57	10.67	-24.9[d]

[a] to maintain secondary standards

[b] tolerance = difference between SIP allowable and SIP estimated emissions after controls

[c] tolerance = difference between SIP allowable and NEDS

[d] tolerance = difference between NEDS and allowable emissions based on 1973 AQ data

[e] 1969 data

[f] based on 1973 air quality

TABLE A-11 REQUIRED EMISSION REDUCTIONS FOR SO_2

	SIP							
AQCR	Maximum Air Quality Concentration ugm/m^3	Emissions (10^3 tons)	Allowable[a] Emissions (10^3 tons)	1975 Estimated Emissions After Controls (10^3 tons)	Percent Reduction Required Based on 1973 AQ Data	NEDS Emissions (10^3 tons)	AQCR Allowable Emissions[f] (10^3 tons)	Emission Tolerance (10^3 tons)
117	67	14.42	11.54	9.11	-233	17.04	56.74	+ 39.7[d]
118	67	44.06	35.24	27.89	- 74	45.72	79.55	+ 33.83[d]
119	not available	252.81	78.19	104.15	- 57	331.63	520.66	+189.03[d]
120	not available	133.59[b]	not available	76.45[b]	+ 20	168.80	135.04	- 33.76[d]
121	— n o t	a v a i l a b l e			- 57	34.05	53.46	+ 19.41[d]
42	— n o t	a v a i l a b l e			+ 63	98.50	36.45	- 62.05[d]

[a] to maintain secondary standards

[b] 1969 data

[d] tolerance = difference between NEDS and allowable emissions based on 1973 AQ data

[f] based on 1973 air quality

APPENDIX B

Regional Air Quality Assessment

TABLE B-1 REGIONAL INDICATORS FOR REVISION OF TSP REGULATIONS

AQCR Name	Air Quality: # Monitors	Air Quality: # Violations	Priority Classification	Expected Attainment Date	Any Proposed AQMA Designations?	Total AQCR Emissions (10^3 tons/yr)	% Emission from Fuel Combustion	Tolerance for Emissions Increase[f] (10^3 tons)
Berkshire 117	6	0	II	7/75	no	2.89	53	+ 0.09
Central Massachusetts 118	9	4	I	7/75	yes	10.56	43	+ 0.64
Metropolitan Boston 119	23	6	I	7/75[c]	yes	36.76	66	-24.62
Metropolitan Providence 120[e]	33	3	I	7/75	yes	26.66	27	- 5.51
Merrimack Valley Southern New Hampshire 121[e]	30	4	I	7/75	yes	19.92	21	- 2.05
Hartford New Haven Springfield 42[e]	67	11	I	7/75	yes	59.40	37	-24.90

[c] for primary standards, that is, 18 month extension given to attain secondary standards

[e] interstate

[f] see Table A-10

TABLE B-2 REGIONAL INDICATORS FOR REVISION OF SO_2 REGULATIONS

AQCR Name	Air Quality: # Monitors	Air Quality: # Violations	Priority Classifications	Expected Attainment Date	Any Proposed AQMA Designations?	Total AQCR Emissions (10^3 tons/yr)	% Emission from Fuel Combustion	Tolerance for Emissions Increase[f] (10^3 tons)
Berkshire 117	7	0	III	a	no	17.04	98	+ 39.70
Central Massachusetts 118	10	0	II	7/75[b]	no	45.72	97	+ 33.83
Metropolitan Boston 119	30	0	I	7/75[c]	yes	331.63	98	+189.03
Metropolitan Providence 120[e]	32	1	I	7/75	yes	241.29	69	- 33.76
Merrimack Valley Southern New Hampshire 121[e]	15	0	I	7/75	yes	114.00	29	+ 19.41
Hartford New Haven Springfield 42[e]	34	1	I	7/75	yes[d]	191.47	51	- 62.05

[a] air quality levels presently below standards

[b] for secondary standards, that is, air quality presently below primary standards

[c] for primary standards, that is, 18 month extension given to attain secondary standards

[d] only for Connecticut counties

[e] interstate

[f] see Table A-11

APPENDIX C

Power Plant Assessment

TABLE C-1 EXISTING MASSACHUSETTS POWER PLANTS

		1975					
AQCR	Plant Name	Capacity MW	Fuel Type	Fuel Quantity Estimated	Regulations %S	Allowable %S by Modeling[f]	Boiler Designed For Coal?
117	None						
118	None[g]						
119	Boston Edison New Boston	760	oil	6926[e]	0.5		no
119	Boston Edison Mystic	624	oil	4424[e]	0.5		yes
119	Salem Harbor Station	802	oil	5260[e]	1.0	2.5	yes
119	Boston Edison Edgar Station	261	oil	2409[e]	1.0		yes
119	Boston Edison Minot	55[a]	oil	207[b]	0.5		not available
119	Boston Edison L Street	115	oil	1059[e]	0.5		yes
119	Cambridge Electric Kendall	67	oil	757[e]	0.5		yes
119	Cambridge Electric Blackstone	25	oil gas	451[d] 305[d]	0.5 N/A		no
119	Brockton Edison	50[a]	oil	141[c]	1.0		not available
119	Boston Edison Co.	12.5[a]	oil	13[b]	0.5		not available
120	Canal Electric Sandwich	1102	oil	5329[e]	1.0		no

TABLE C-1 cont.

AQCR	Plant Name	1975 Capacity MW	Fuel Type	Fuel Quantity Estimated	Regulations %S	Allowable %S by Modeling[f]	Boiler Designed For Coal?
120	New England Power Somerset	1097	oil	14668[a]	1.0	2.5	yes
120	Montaup Electric Co. Somerset	325	oil	3262[e]	1.0	2.5	yes
120	Taunton Municipal Light-Taunton	46	oil	332[e]	1.0		no
120	Taunton Municipal Light & Water Taunton	118	oil	263[e]	1.0		yes
120	New Bedford Edison New Bedford	93	oil	725[e]	1.0		yes
120	Fall River Electric Co. Fall River	14.2[d]	oil	97[d]	1.0		not available
121	None						
42	Western Mass. Electric West Springfield	210	oil gas	1662[e] 2822[e]	1.0 1.0	2.5 2.5	yes yes
42	Holyoke Water Power MT TOM-Holyoke	136	oil	1366[e]	1.0	2.5	yes
42	Holyoke Gas Electric Holyoke	30	oil gas	282[e] 950[e]	1.0 N/A		yes
42	Holyoke Power Riverside-Holyoke	45	oil	263[e]	1.0		yes

[a] assume 1 MW 10 x 10^6 BTU

[b] 1970 NEDS data base

[c] 1971 NEDS data base

[d] 1972 data-Steam Electric Plant Factors, 1973 Edition, National Coal Association, Washington, D.C.

[e] 1973 Federal Power Commission data base

[f] These modeling results, which were completed by EPA (OAQPS), are not an endorsement to switch fuels

[g] The Power Plant listed in NEDS ceased operations at the end of 1971

units - oil 1000's bbls
coal 1000's tons
gas MCF

TABLE C-2 MASSACHUSETTS POWER PLANTS
PLANNED NEW UNITS TO EXISTING
FACILITIES BY 1975[c]

AQCR	Name	1975 Capacity MW	Fuel Type	Fuel Quantity	Regulation %S	Allowable %S by Modeling
117	None					
118	None					
119	Boston Edison Co. Mystic	587	oil	6611[a]	0.5	----
120	Canal Electric Sandwich	560	oil	6307[a]	1.0	----
121	None					
42	None					

[a]based on MW (9×10^6 BTU/MW Hr)(.9)[B](8760 Hr/Yr) ÷ (150×10^6 BTU/1000 gals) ÷ 42 gals/BBL = 1000's BBL/Yr

[B]assume efficiency = 90%

[c]Steam Electric Plant Factors, 1973 Edition, National Coal Association, Washington, D.C.

units - oil 1000's bbls

TABLE C-3 MASSACHUSETTS POWER PLANT SUMMARY BY AQCR

AQCR		Sulfur Dioxide: 1975 Fuel Required by Existing Regulations ≤ 0.5%S	≤ 1.0%S	>1.0%S	1975 Emission Reduction[b] (tons/yr)	Sulfur Dioxide: 1975 Fuel Required by Modeling[f] < 0.5%S	<1.0%S	>1.0%S	1975 Emission Reduction (tons/yr)	TSP: 1975 Emission Reductions Based on Existing Regulations[b,c] (tons/yr)
Berkshire 117		No Plants								
Central Massachusetts 118		No Plants								
Metropolitan Boston 119	coal	0	0	0	0	Not Available				0
	oil	20,448[a]	7,810	0	84,366[d]					-4324[d]
	gas	305	0	0	0					0
Metropolitan Providence 120	coal	0	0	0	0	Not Available				0
	oil	0	24,676[a]	0	43,370[d]					-4528[d]
	gas	0	0	0	0					0
Merrimach Valley Southern New Hampshire 121		No Plants								
Hartford-New Haven-Springfield 42	coal	0	0	0	0	Not Available				0
	oil	0	3,573	0	30,262					+11,225
	gas	3,772	0	0	0					0

[a] includes new facilities

[b] reduction calculated from NEDS emission rates

[c] all units on line prior to 1974 were assumed to be considered as an existing facility

[d] these reductions do not account for increases due to new units coming on after 1972

[e] The Power Plant listed in NEDS ceased operations at the end of 1971

[f] by EPA (OAQPS)

Units - oil 1000's gals, coal 1000's tons, gas MCF

TABLE C-4 MASSACHUSETTS "MODELING ANALYSIS OF POWER PLANTS FOR FUEL CONVERSION" BY WALDEN RESEARCH DIVISION OF ABCOR INC.*

AQCR Name	AQCR No.	Plant/Conversion	Maximum 24-Hour Concentration (ug/m^3) SO_2 Nominal Load	SO_2 Secondary Standard Exceeded?	SO_2 Maximum Load	SO_2 Secondary Standard Exceeded?	Particulates Nominal Load	Particulates Secondary Standard Exceeded?	Particulates Maximum Load	Particulates Secondary Standard Exceeded?	Maximum Annual Concentration (ug/m^3) SO_2	SO_2 Secondary Standard Exceeded?	Particulates	Particulates Secondary Standard Exceeded?
Berkshire	117	None												
Central Massachusetts	118	None												
Metro. Boston	119	Salem Harbor												
		1972 Operations	35		41		3		3		2		1	
		switch units 1, 2, 3	163	no	193	no	17	no	20	no	11	no	1	no
		no interactions with other plants												
Metro. Providence	120	New England Power Company Somerset												
		1972 Operations	111		114		7		7		6		1	
		contribution from Montaup Electric Co. - Somerset	0		0		0		0		2		1	
		total	111	no	114	no	7	no	7	no	8	no	1	no
		Switch Unit 3 (1.5%S)	173		177		12		12		8		1	
		Montaup (with switch)	0		0		0		0		6		1/2	
		total	173	no	177	no	12	no	12	no	14	no	1/2	no
		Switch Unit 3 (2.5%S)	241		243		12		12		11		1	
		Montaup (with switch)	0		0		0		0		6		1/2	
		total	241	no	243	no	12	no	12	no	17	no	1/2	no
		Switch Units 1, 2, 3(2.5%S)	487		502		20		21		24		1	
		Montaup (with switch)	0		0		0		0		6		1/2	
		total	487	yes	502	yes	20	no	21	no	30	no	1/2	no
	120	Montaup Electric Co. Somerset												
		1972 Operations	155		181		12		14		14		1	
		contribution from New England Power Company Somerset	0		0		0		0		4		1/2	
		total	155	no	181	no	12	no	14	no	18	no	1/2	no

TABLE C-4 cont.

AQCR Name	AQCR No.	Plant/Conversion	Maximum 24-Hour Concentration (ug/m^3) SO_2 Nominal Load	SO_2 Secondary Standard Exceeded?	SO_2 Maximum Load	SO_2 Secondary Standard Exceeded?	Particulates Nominal Load	Particulates Secondary Standard Exceeded?	Particulates Maximum Load	Particulates Secondary Standard Exceeded?	Maximum Annual Concentration (ug/m^3) SO_2	SO_2 Secondary Standard Exceeded?	Particulates	Particulates Secondary Standard Exceeded?
Metro. Providence (cont.)	120	Montaup Electric Co. Somerset (cont.)												
		Switch Units 7 & 8 (2.5$S)	517		583		175		189		47		1	
		New England Power (with switch[b])	0		0		0		0		7		2	
		total	517	yes	583	yes	175	yes	189	yes	54	no	2	no
		Switch Units 7 & 8 (2.5$S)	517		583		175		189		47		1	
		New England Power (with switch[c])	0		0		0		0		9		2	
		total	517	yes	583	yes	175	yes	189	yes	56	no	2	no
		Switch Units 7 & 8 (2.5$S)	517		583		175		189		47		1	
		New England Power (with switch[d])	0		0		0		0		20		2	
		total	517	yes	583	yes	175	yes	189	yes	67	yes	2	no
Merrimack Valley Southern New Hampshire	121	None												
Hartford-New Haven Springfield	42	None												

[a] report to EPA 9/12/74
[b] switch unit 3 to 2.5$S coal
[c] switch unit 3 to 2.5$S coal
[d] switch unit 1, 2, 3 to 2.5$S coal

TABLE C-5

POWER PLANT CONVERTIBLE UNITS ANALYZED BY WALDEN[a]

Plant	Unit No.	% Sulfur Coal	% Ash Coal	Particulate Control Efficiency	Estimated Annual Coal Use* 10^3 Ton
Mason	3,4	2.5	15	80	202
Salem Harbor	1,2,3	2.5	15	95	757
South Street	121,122	2.0	20	90	271
Schiller	4,5	2.5	15	90	283
Montville	1,2,5	3.0	15	80	416
Brayton Point	1,2,3	2.5	15	98	2,688
	3	1.5	15	98	1,431
Somerset	7,8	2.5	15	85	463

* Coal use estimated on the basis of equivalent BTU heating value of 1972 oil (and gas, if any) used in units designated for possible conversion.

[a] report to EPA 9/12/74

APPENDIX D

Industrial, Commercial, Institutional Source Assessment

TABLE D-1 MASSACHUSETTS SIGNIFICANT SOURCES[a]

AQCR Name	AQCR No.	NEDS TSP Emissions tons/yr	NEDS SO_2 Emissions tons/yr	Reductions Under Existing Regulations[c] TSP tons/yr	Reductions Under Existing Regulations[c] SO_2 tons/yr	% NEDS TSP Emissions From Coal[b] (before Regulations)
Berkshire	117	569	8602	484	4022/-244[d]	0
Central Massachusetts	118	1101	15439	746	7276	49
Metropolitan Boston	119	Critical Areas	Boston Core Cities	Critical Areas	Boston Core Cities	Critical Areas
		1666	1025	225	813	68
		Rest of AQCR	Rest of AQCR	Rest of AQCR	Rest of AQCR	Rest of AQCR
		96	8594	94	4441	0
Metropolitan Providence	120	532	826	38	346	96
Merrimack Valley - Southern New Hampshire	121	1136	7997	366	4004	64
Hartford - New Haven Springfield	42	4775	13240	250	5488	97

[a]See Table A-6

[b]only for significant sources not including power plants

[c]except of AQCR 119 assume 67% of BTU generated were in areas of critical concern reduction calculated from NEDS data

[d]first value is reduction due to statewide 1% sulfur regulation. Second value is reduction (increase since less than zero) due to 2.2% S regulation adopted by State for Region 117.

TABLE D-2

MASSACHUSETTS LISTING OF SIGNIFICANT SOURCES

AQCR Name	AQCR No.	Significant TSP Sources		Significant SO_2 Sources	
		Name	Location	Name	Location
Berkshire	117	General Electric Co.	Pittsfield	General Electric Co.	Pittsfield
		Rising Paper Co.	Great Barrington	Rising Papers Co.	Great Barrington
		Kimberly Clark Corp.	Columbia Mill, Lee	Kimberly Clark Corp.	Columbia Mill, Lee
		Arnold Print Works	Adams	Sprague Electric Co.	N. Adams
		Kimberly Clark Corp.	Eagle Mill, Lee	Arnold Print Works	Adams
		Sprague Electric Co.	N. Adams	Kimberly Clark Corp.	Eagle Mill, Lee
		Rochester Paper Co.	Adams	Hurlbut Papers	Laurel Mill, S. Lee
		Hurlbut Papers	Laurel Mill, S. Lee	Rochester Paper Co.	Adams
				Williams College	Williamstown
Central Massachusetts	118	Mass. Electric, Webster	Worchester	Mass. Electric, Webster	Worchester
		Fitchburg Paper Co.	Fitchburg	Fitchburg Gas & Electric	Fitchburg
		Cranston Print Works	Webster	Cranston Print Works	Webster
		Norton Co.	Worchester	Norton Co.	Worchester
		Borden Inc. Chem. Div.	Leominster	Fitchburg Paper Co.	Fitchburg
		Fitchburg Gas & Electric	Fitchburg	Foster Grant Co.	Leominster
		Heywood-Wakefield Co.	Gardner	Wyman Gordon Co.	N. Grafton
		Westboro State Hospital	Westborough	Worchester Cold Storage	Worchester
		Romar Tissue Mills	Hardwick	Borden Inc. Chem. Div.	Leominster
		Foster Grant Co.	Leominster	Grafton State Hospital	N. Grafton
		Barre Wool Combing Co.	S. Barre	Heywood-Wakefield Co.	Gardner
		Wyman Gordon Co.	N. Grafton	Romar Tissue Mills	Hardwick
		Worchester State Hospital	Worchester	Barre Wool Combing Co.	S. Barre
		Whitten Machine Works	Whittinsville	College of Holy Cross	Worchester
		Worchester Cold Storage	Worchester	Westboro State Hospital	Westborough
				Whitten Machine Works	Whittinsville
				North American Rockwell	Hopedale
				Worchester State Hospital	Worchester
				Haywood Schuster Mills	E. Douglas
				The Felters Co.	Millbury
				Worchester City Hospital	Worchester
				Gardner State Hospital	Gardner
				E. Bernat & Sons Co.	Uxbridge
Metropolitan Boston Massachusetts	119	Boston Engine Terminal	Boston	General Electric	Lynn
		General Electric	Lynn	Eastman Gelatin Corp.	Peabody
		Penn-Central	Boston	Tileston & Hollingsworth	Boston
		Eastman Gelatin Corp.	Peabody	Harvard Medical School	Boston
		Bird & Son	E. Walpole	Boston Naval Shipyard	Charlestown
		Tileston & Hollingsworth	Boston	Mass. Institute of Tech.	Cambridge
				Bird & Son	E. Walpole
Metropolitan Providence (Mass. - R.I.)	120	Otis Air Force Base	Sandwich	Firestone Rubber	Fall River
		Firestone Rubber	Fall River	Texas Instruments	Attleboro

TABLE D-2 cont.

AQCR Name	AQCR No.	Significant TSP Sources		Significant SO_2 Sources	
		Name	Location	Name	Location
Merrimack Valley Southern New Hampshire (Mass. - N.H.)	121	Boston & Maine	Billerica	Continental Can Co.	Haverhill
		Greater Lawrence Ind.	Lawrence	Oxford Paper Co.	Lawrence
		Continental Can Co.	Haverhill	Mead Corp.	Lawrence
		Oxford Paper Co.	Lawrence	Greater Lawrence Ind.	Lawrence
		Mead Corp.	Lawrence	Boott Mill	Lowell
		General Tire - Bolta Div.	Lawrence	General Tire - Bolta Div.	Lawrence
		Western Electric Co.	N. Andover	Western Electric Co.	N. Andover
		Boott Mill	Lowell	Phillips Acad.	Andover
				Lowell General Hospital	Lowell
				Tyer Rubber Corp.	Andover
				Parkwood Laminates	Lowell
				Boston & Maine	Bellerica
				Steam Assoc.	Lowell
				Wamesit Power Co.	Lowell
				Rowland Ind.	Lawrence
				Hamel Leather Co.	Haverhill
				Joan Fabrics Corp.	Lowell
				Corenco Corp.	Tewksbury
				Bon Secours Hospital	Methuen
Hartford - New Haven - Springfield (Conn. - Mass.)	042	University of Massachusetts	Amherst	University of Massachusetts	Amherst
		Monsanto	Springfield	Monsanto	Springfield
				Uniroyal Corp.	Chicopee
				Ware Industries	Ware
				Hodges Carpet	Springfield
				Westfield River Paper	Russell
				Strathmore Paper	W. Springfield
				Deerfield Glassine Co.	Monroe
				Northampton State Hospital	Northampton
				Monson State Hospital	Palmer
				Springfield Awning Co.	Springfield
				Chicopee Manufacturing	Chicopee
				Smith College	Northampton
				Franklin Paper	Holyoke

APPENDIX E

Area Source Assessment

TABLE E-1
AREA SOURCES[a]

AQCR Name	AQCR No.	Fuel Burned			Emissions	
		Type	Amount[b]	% S	Part.	SO_2
Berkshire	117	Coal:				
		Anthracite	1600	0.7	12	30
		Bituminous	900	1.5	43	37
		Oil:				
		Distillate	67890	0.3	403	1446
		Residual	32790	2.3	377	5921
		Gas:				
		Natural	3480	---	30	0
		Process	0	---	0	0
		Wood:	1900	---	24	0
					889	7434
Central Massachusetts	118	Coal:				
		Anthracite	2800	0.7	21	52
		Bituminous	3010	1.5	164	108
		Oil:				
		Distillate	268,740	0.3	1610	5724
		Residual	136,960	2.3	1575	24,728
		Gas:				
		Natural	16140	---	140	4
		Process	0	---	0	0
		Wood:	2900	---	36	1
					3546	30,617
Merrimack Valley - Southern New Hampshire	121	Coal:				
		Anthracite	2990	0.7	22	55
		Bituminous	2160	1.5	110	84
		Oil:				
		Distillate	207,040	0.3	1244	4410
		Residual	107,610	2.3	1238	19,429
		Gas:				
		Natural	13,530	---	119	4
		Process	0	---	0	0
		Wood:	400	---	5	0
					2738	23,982

TABLE E-1 (cont.)

AQCR Name	AQCR No.	Fuel Burned			Emissions	
		Type	Amount[b]	% S	Part.	SO_2
Metropolitan Boston	119	Coal:				
		Anthracite	14,870	0.7	109	275
		Bituminous	11,250	1.5	580	431
		Oil:				
		Distillate	1,300,240	0.3	7800	27,695
		Residual	673,570	2.3	7746	121,613
		Gas:				
		Natural	81,900	---	718	23
		Process	0	---	0	0
		Wood:	2200	---	27	1
					16,980	150,038
Hartford - New Haven - Springfield	42	Coal:				
		Anthracite	7880	0.7	58	146
		Bituminous	3590	1.5	157	157
		Oil:				
		Distillate	269,140	0.3	1618	5733
		Residual	140,940	2.3	1621	25,447
		Gas:				
		Natural	15,630	---	136	4
		Process	0	---	0	0
		Wood:	4900	---	61	1
					3651	31,488
Metropolitan Providence	120	Coal:				
		Anthracite	1470	0.7	11	27
		Bituminous	2420	1.5	138	82
		Oil:				
		Distillate	280,360	0.3	1696	5971
		Residual	152,360	2.3	1753	27,508
		Wood:	1800	---	22	0
					3810	33,594

[a]NEDS data.

[b]Coal in tons; oil in 1000 gals.; gas in 10^6CF; wood in tons.

TABLE F-1

EFFECTIVENESS OF REGULATION 5.1.1
(Number of towns in each category)

District		No Significant Effectiveness	Minor Effectiveness	Moderate Effectiveness	Major Effectiveness
Metropolitan Boston	AQCR 119	64	14	7	17
Merrimack Valley-Southern New Hampshire	AQCR 121				
Metropolitan Providence	AQCR 120				
Central Massachusetts	AQCR 118	(Regulation 5.1.1 is not applicable in the other districts)			
Hartford - New Haven - Springfield	AQCR 42				
Berkshire	AQCR 117				

NOTES: (1) Regulation 5.1.1 requires the use of 0.5% sulfur content residual oil in 13 cities and towns surrounding Boston.

TABLE F-2

EFFECTIVENESS OF REGULATION 5.1.2
(Number of towns in each category)

District		No Significant Effectiveness	Minor Effectiveness	Moderate Effectiveness	Major Effectiveness
Metropolitan Boston	AQCR 119	68	26	7	1
Merrimack Valley-Southern New Hampshire	AQCR 121	24	4	0	0
Metropolitan Providence	AQCR 120	34	13	7	6
Central Massachusetts	AQCR 118	48	10	2	0
Hartford - New Haven - Springfield	AQCR 42	58	7	4	0
Berkshire	AQCR 117	30	2	0	0

NOTES: (1) Regulation 5.1.2 requires the use of 1.0% sulfur content residual oil.

TABLE F-3

EFFECTIVENESS OF REGULATION 5.1.3[1]
(Number of towns in each category)

District		No Significant Effectiveness[2]	Minor Effectiveness	Moderate Effectiveness	Major Effectiveness
Metropolitan Boston	AQCR 119	102	0	0	0
Merrimack Valley-Southern New Hampshire	AQCR 121	28	0	0	0
Metropolitan Providence	AQCR 120	60	0	0	0
Central Massachusetts	AQCR 118	60	0	0	0
Hartford - New Haven - Springfield	AQCR 42	69	0	0	0
Berkshire	AQCR 117	32	0	0	0

NOTES: (1) Regulation 5.1.3 requires the use of distillate oil with a sulfur content not exceeding 0.3%.

(2) This conclusion is based on the assumption that 0.5% sulfur distillate oil was used by all area sources prior to application of the regulation.

TABLE F-4

EFFECTIVENESS OF REGULATION 5.4.1
(Number of towns in each category)

District		No Significant Effectiveness	Minor Effectiveness	Moderate Effectiveness	Major Effectiveness
Metropolitan Boston	AQCR 119	102	0	0	0
Merrimack Valley-Southern New Hampshire	AQCR 121	28	0	0	0
Metropolitan Providence	AQCR 120	60	0	0	0
Central Massachusetts	AQCR 118	60	0	0	0
Hartford - New Haven - Springfield	AQCR 42	69	0	0	0
Berkshire	AQCR 117	32	0	0	0

NOTES: (1) Regulation 5.4.1 requires that the ash content of fuels not exceed 9% of dry weight.

TABLE F-5

EFFECTIVENESS OF REGULATION (ALL SO_2 REGULATIONS)
(Number of towns in each category)

District		No Significant Effectiveness	Minor Effectiveness	Moderate Effectiveness	Major Effectiveness
Metropolitan Boston	AQCR 119	39	23	17	23
Merrimack Valley-Southern New Hampshire	AQCR 121	24	4	0	0
Metropolitan Providence	AQCR 120	34	14	6	6
Central Massachusetts	AQCR 118	47	11	2	0
Hartford - New Haven - Springfield	AQCR 42	58	8	3	0
Berkshire	AQCR 117	30	2	0	0

NOTES: (1) This includes Regulations 5.1.1, 5.1.2, 5.1.3 and 5.4.1.

TABLE F-6

EFFECTIVENESS OF REGULATION 5.4.1
(Number of towns in each category)

District		No Significant Effectiveness	Minor Effectiveness	Moderate Effectiveness	Major Effectiveness
Metropolitan Boston	AQCR 119	28	46	19	9
Merrimack Valley-Southern New Hampshire	AQCR 121	26	0	2	0
Metropolitan Providence	AQCR 120	46	7	3	4
Central Massachusetts	AQCR 118	55	3	1	1
Hartford - New Haven - Springfield	AQCR 42	37	9	8	15
Berkshire	AQCR 117	30	2	0	0

NOTES: (1) Regulation 5.4.1 requires that the ash content of fuels not exceed 9% of dry weight.

TABLE F-7

EFFECTIVENESS OF REGULATION 2.5.1
RELATIVE TO FOSSIL FUEL UTILIZATION FACILITIES
(Number of towns in each category)

District		No Significant Effectiveness	Minor Effectiveness	Moderate Effectiveness	Major Effectiveness
Metropolitan Boston	AQCR 119	102	0	0	0
Merrimack Valley-Southern New Hampshire	AQCR 121	28	0	0	0
Metropolitan Providence	AQCR 120	60	0	0	0
Central Massachusetts	AQCR 118	60	0	0	0
Hartford - New Haven - Springfield	AQCR 42	69	0	0	0
Berkshire	AQCR 117	32	0	0	0

NOTES: (1) Particulate emissions are assumed to be reduced to 80% of pre-regulation levels in the critical areas of concern.

TABLE F-8

EFFECTIVENESS OF REGULATION 2.5.2
RELATIVE TO LARGE PROCESS SOURCES OF PARTICULATE EMISSIONS
(Number of towns in each category)

District		No Significant Effectiveness	Minor Effectiveness	Moderate Effectiveness	Major Effectiveness
Metropolitan Boston	AQCR 119	102	0	0	0
Merrimack Valley-Southern New Hampshire	AQCR 121	16	7	6	3
Metropolitan Providence	AQCR 120	55	2	1	2
Central Massachusetts	AQCR 118	42	9	4	5
Hartford - New Haven - Springfield	AQCR 42	M.D.	M.D.	M.D.	M.D.
Berkshire	AQCR 117	29	2	1	0

NOTES: (1) Particulate emissions from all large process sources are assumed to be reduced to 25.7 lbs/hour, the allowable emission rates from a process with a production rate of 200,000 lbs/hour in critical areas of concern, according to the process weight table in Regulation 2.5.2.

M.D. Indicates missing data.